AMENDMENTS TO THE SPECIFICATION

Please insert the following above paragraph [0001] of the published application:

--FIELD OF INVENTION--

Please insert the following above paragraph [0002] of the published application:

--BACKGROUND—

Please insert the following above paragraph [0008] of the published application:

--SUMMARY--

Please insert the following above paragraph [0047] of the published application:

--BRIEF DESCRIPTION OF THE DRAWINGS--

Please insert the following above paragraph [0050] of the published application:

--DETAILED DESCRIPTION--

Please amend the following paragraphs as follows:

[0006]~~On account of new~~ New designs of the hollow shafts [[as]]include light metal shafts (for example comprising aluminium, magnesium, etc.), moreover, there is a requirement for different materials to be joined. This is only possible with very considerable restrictions using the commercially available welding processes described above. One reason for this, in the context of hollow shafts comprising an aluminium alloy, is for example the oxide layer which is formed.

[0008]Working on this basis, ~~it is an object of~~ the present invention ~~to provide~~ provides an improved process for fixing at least one balancing weight to at least one location on a hollow shaft. In so doing, the technical problems which have been mentioned in connection with the prior art are ~~to be~~ avoided or at least partially reduced. Furthermore, it is intended to specify a hollow shaft which can be used in particular for use in a drive system of a vehicle.

[0009]~~These objects are achieved by a~~ A process for fixing at least one balancing weight to at least one location on a hollow shaft, ~~having the features of Patent Claim 1~~ and a resulting hollow shaft ~~having the features of Patent claim 11~~ are disclosed. Advantageous configurations of the process and of the hollow shafts are described in the respective ~~dependent~~ patent claims. In this context, it should be noted that the technical features listed individually in the patent claims can be combined with one another in any technologically appropriate way and lead to further embodiments of the invention.

[0010]The process according to the invention for fixing at least one balancing weight to at least one location on a hollow shaft is characterized in that the at least one balancing weight is secured to the at least one location by ~~means of~~ soldering or brazing. The term "soldering" is to be understood as meaning a joining process which in particular comprises joining metallic materials by ~~means of~~ melting additional substances (solders); the melting point of these solders is below that of the two materials of the parts to be joined (in this case the hollow shaft and the balancing weight). This process is advantageous since it is also simple to integrate in series production and the desired joins can be generated without significantly affecting the properties of the balancing weight and/or of the hollow shaft. In particular, the relatively low working temperatures means that microstructural damage or tempering phenomena are avoided.

[0018]According to a further configuration of the process, the at least one balancing weight is secured by ~~means of~~ soft soldering. The use of the soft soldering joining process reduces the stresses on the hollow shaft or the balancing weight as a result of the effective temperature during the securing operation still further. At the same time, shorter heating times are required, and

consequently it is in this case possible for the metal balancing plates to be fixed to the hollow shaft in a very time-saving and consequently also cost-saving way.

[0019]It is in this context particularly advantageous for the hollow shaft, at the at least one location, not to exceed a brief maximum temperature of 450° C. during the soldering. The maximum temperature ~~is preferably~~ can be even lower, for example in a range from 250° C. to 330° C.

[0024]Fluxes, which have the function of removing the oxide layer from the metallic surface, in many cases include chemical substances which have a harmful influence on health and/or the environment. In this respect, in particular in the context of series production, it is particularly advantageous for the fixing of balancing weights to be carried out by ~~means of~~ solder but without flux. Further advantages which may be mentioned are in particular that, on account of the use of a flux-free solder, it is no longer possible for any corrosion to occur as a result of flux residues, there is no need for flux residues to be cleaned off the components, and the solder is in particular free of heavy metals and can if appropriate be recycled.

[0025]In order nevertheless to ensure a high-quality soldered join between metal balancing plate and hollow shaft, it may be advantageous, for example, for the oxide layer to be removed from the location of the hollow shaft at which the metal balancing plate is to be fixed, in a preceding manufacturing step. By way of example, to break open an oxide layer which has formed on that surface of the hollow shaft which is to be soldered, prior to the soldering without the use of flux, it is possible to bring about a relative movement between the solder and the hollow shaft. For this purpose, by way of example, the solder, a balancing weight to which solder has already been applied and/or the hollow shaft can be made to vibrate. Furthermore, it is also possible for the layer of oxide to be mechanically removed or reduced by further ~~means~~processes. It is in this context possible, for example, to use grinding tools, in particular belt grinding tools. It is used to abrasively remove the layer of oxide at least from the region of the desired soldering position.

[0030]The prior application of solder or prior fixing of the solder to the balancing weight can be carried out, for example, by ~~means of~~ a solder foil by soldering, positive locking or non-positive locking. If a solder liquid is used, this liquid can be applied to the preheated balancing weight, in particular by spraying, at a temperature, for example, of approximately 250°.

[0033]According to another configuration of the process, at least one of the following heat sources is used for the soldering: inductor, convector. In this context, the term inductor is to be understood as meaning heat sources which, in accordance with the Joule's resistance heating principle, effect self-heating of the components. Convectors comprise heating surfaces which are heated in a different, non-electrical[[,]] way and emit heat. It is preferable to provide a separate heat source for each location on the hollow shaft at which a balancing weight is to be fixed, in order to enable the joining process to be carried out very quickly. However, for certain applications it may also be advantageous for a single heat source to heat at least a plurality of the locations. In this context, it should be pointed out that it is in principle possible for the heat source to be introduced via only one of the sub-components (balancing weights, hollow shaft). In particular, at least one of the following ~~means~~ can be used as heat sources for the soldering process: arc (plasma, TIG, etc.); electrical resistance; soldering iron; friction (high-frequency friction (ultrasonic), face friction); induction; laser beam (diode, Nd-YAG, etc.); gas flame; hot air; infrared light.

[0040]The hollow shafts described here are used, for example, for torque transmission and are accordingly operated, for example, at rotational speeds of up to 8000 ^{1}~~/min~~ rpm or even 12000 ^{1}~~/min~~rpm [revolutions per minute] while they are in use. In this case, torques in the range up to 5000 (static) Nm [Newton ~~metres~~meters] are transmitted. Hollow shafts of this type are used in particular as propshafts of vehicles with rear wheel drive (such as for example limousines, small transporters, vans). Hollow shafts of this type are also used, for example, in wind power plants, machine tools or other drive trains. Hollow shafts produced in this manner usually rotate at a rotational speed of at least 3000 ^{1}~~/min~~rpm in use. With these highly stressed, thin-walled hollow shafts, it ~~is~~can be especially important to ensure permanent fixing of the balancing weights, since detachment of the weights in use leads to the balancing weights being thrown into the surrounding

area at a very high speed, which could cause them to hit other components ~~and/or people~~. This is avoided by the way of producing the soldered join described above.

[0042]Furthermore, it is also proposed that the at least one balancing weight at least has a density of 7.0 g/cm^3 [grams per cubic ~~centimetre~~centimeter]. It is preferable for the balancing weights used to be metal balancing plates made from steel or copper. The relatively high density has the advantage that only a small number of balancing weights or only relatively small balancing weights have to be fixed to the hollow shaft. Such small balancing weights are also more dimensionally stable and are easier to join in punctiform fashion. This saves both materials costs and joining times. In particular, at least one of the following materials is preferred for the balancing weight: iron (7.3 g/cm^3), copper (8.9 g/cm^3), zinc (7.1 g/cm^3) or tungsten (19.25 g/cm^3).

[0043]According to another configuration of the hollow shaft, the at least one balancing weight has a height which does not exceed 3 mm [~~millimetres~~millimeters]. It is preferable for all the balancing weights to be of the same height. This, combined with a correspondingly adapted solder surface area, means that approximately identical gravity forces act on the solder material, and therefore a similar safety standard can be ensured for all balancing weights.

[0048]FIG. 1 shows a diagrammatic and perspective view of a vehicle with a drive system comprising a hollow shaft with balancing weights, in accordance with an embodiment of the invention, and

[0049]FIG. 2 shows a section through a detail of a hollow shaft with balancing weight in accordance with an embodiment of the invention.

[0051]FIG. 2 shows a diagrammatic illustration, in cross section through the hollow shaft 3, of a soldered join 12. The hollow shaft 3 has a diameter 8 in the range from 40 to 100 mm, with a wall thickness 9 in the range from 1.5 to 3 mm. A balancing weight 1 has now been fixed to the surface of the hollow shaft 3, secured to the hollow shaft 3 by ~~means of~~ a solder material 4. The balancing weight 1 ~~consists of~~ comprises a steel material with a height of approximately 3 mm. This

soldered join 12 is produced by the balancing weight 1 being oriented with respect to the hollow shaft 3 and pressed onto the surface of the hollow shaft 3 with a joining force 6, the heat required to melt the solder material 4 being generated by ~~means of~~ the heat source 7. The temperature generated is above the melting range of the solder material 4; the melting range is to be understood as meaning the temperature range at which suitable wetting of the solder with respect to the joining components is achieved. The fixing of the balancing weight 1 is effected by means of soft soldering or brazing.